

	PROCESSES	24.1	.With classifying or separating of material
1	.By operations other than force of contact with solid surface	24.11	..Including separating liquid from solid
2	.With cell rupturing or liberation of contained liquids	24.12	..Of plural, diverse materials
		24.13	...Including metal
3	.With solidifying, consolidating or shaping	24.14	....Magnetically , electrostatically, or by use of eddy currents
4	.Laminated or fibrous mineral material	24.15	....Sorting by use of sieve
5	.By utilizing kinetic energy of projected or suspended material	24.16	...Including food
		24.17	...Including rubber
		24.18	...Including plastic
6	.Cereal and other seeds or seed parts	24.19	...Including fibrous material, e.g., paper
7	..With operation to detach or loosen adhering hull portion	24.2	....Wood or bark
		24.21	....Sorting by use of sieve
8	..With application of fluid to, or heating or cooling of, whole seed	24.22	...Including glass
		24.23	...Including clay
		24.24	...Including coal
9	..With separation or classification	24.25	..Of metal
		24.26	..Of food
10	...With recombination or recirculation of separated parts	24.27	..Of rubber
		24.28	..Of plastic
		24.29	..Of fibrous material
11	...Successive alternate separation and comminution steps	24.3	..Of glass
		24.31	..Of coal
		25	.Combined
12	..With application of fluid	26	.By contact between relatively moving portions of material
13	..Plural successive comminuting operations	27	.Subjecting material to impact by moving comminuting surface
14	.Selective or differential comminution of mixed or bonded solids	28	.Wood and similar natural-fibrous vegetable material
15	.With application of fluid or lubricant material	29	.Plural successive comminuting operations
16	..To aid dispersion or prevent chemical reaction, deliquescence, agglomeration or frothing	30	.Miscellaneous
			APPARATUS
17	..With additional heating or cooling	31	.With explosion preventing or relieving means
18	..Gas or vapor	32	.With overload release means
19	...To classify or separate material	32.5	.With sink drain stopper interlock
		33	.With automatic control
20	..Liquids added to classify or separate material	34	..Of feed of material
		35	...By speed or torque of comminator drive
21	..Liquids added to make pulp or suspension	36	..Of comminator drive
22	.Application of solids to material	37	..Of comminuting surface contiguity
23	.With heating or cooling of material	37.5	.With means to protect operator from injury

38	..Including means applying fluid to material	55	...Comminuting element or comminuting element attached, gas moving means
39	..Fluid comminutor type		
40	...Stationary abutment impact only	56	...Gas moving means and rotary comminuting element on same shaft
41	..Plural fluid applying means on same material	57	...Local application within comminuting zone
42	...With plural comminuting zones	58	...Suction applied above and coaxially of comminuting member or members
43	..With plural comminuting zones		
44	...Parallel material flow type	59	...With non-automatic gas flow control means
45	...Horizontal fluid current past successive comminuting zone	60	..Applied subsequently to comminuting
46.01	..Liquid submerged comminuting zone	61	...With recirculation of material to comminuting zone
46.012	...Combined with dishwasher	62	..Applied prior to comminuting
46.013	...Under-sink garbage disposal	63	..With simultaneous control of interrelated feed, drive and/or surface positioning means
46.014	....Having particular housing structure	64	..Control of feed and surface positioning means only
46.015	....Provision to mount to sink	65	..With temperature modification of material
46.016	....Inlet provision	66	..Temperature modification of comminuting member
46.017	...Striker having vertical axis	67	...Thermal fluid within or carried by moving comminuting member
46.02	...With material feed means	68	..With separation or classification of material
46.04	...Including adjustable component	69	..Comminuted material discharge permitting screen
46.06	...By cooperating members	70	...Screen partition or end wall in rotary drum
46.08	....Including centrifugally driven striking member (i.e., hammer mill)	71	....Plural partitions or end walls
46.11	....Including impeller-type agitating means	72	....Series flow of material
46.13	....Reciprocating or oscillating	73	...Arcuate screen concentric with rotary comminuting member
46.15	....Including roller or roller-like member (e.g., ball, cylinder, etc.)	74	...Annular screen above or surrounding comminuting zone
46.17	...By rotating impeller-type agitating means	75	..Parallel material flow through plural comminuting zones and/or separators
47	..Gas swept comminuting zone	76	..Series material flow only through plural alternate comminuting zones and separators
48	...With recirculation of gas to comminuting zone	77	..Comminuting zone interposed between plural separators
49	...Gas borne material applied to screen	78	..Separator interposed between plural comminuting zones
50	....Elevating fan on comminutor shaft		
51	....Screen forms part of comminuting surface		
52	...With return of removed oversize material to comminuting zone		
53Suction applied above and coaxially of comminuting member or members		
54	...Horizontal gas current through rotary drum		

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|------|--|--------|---|
| 79 | ..Separator in discharge from comminuting zone | 88 |Provided with special comminuting surfaces or characteristics |
| 79.1 | ...By adhesion, electric field force, specific gravity, or chemical change | 88.1 |Perforation bounded by sharp edge |
| 79.2 | ...Rotating comminutor combined with a sifting device | 88.2 |And auxiliary imperforate surface (e.g., breakerplate) |
| 79.3 |Sifting device rotates | 88.3 |Three or more serially acting alternate perforate and imperforate surfaces |
| 80 | ...Oversize return to comminuting zone | 88.4 |Spaced parallel bars (e.g., "grate") |
| 81 | ..Separator in feed to comminuting zone | 89 | ...Hinged or dumping type screen or support |
| 82 | ..Projected material trap chamber | 89.1 |With means to change or adjust comminuting position of screen or screen element |
| 82.1 | ..Helical pusher inside tube moves material toward perforated member | 89.2 |Removable or interchangeable screen or screen portion |
| 82.2 | ..With means to vary particle coarseness | 89.3 |Stationary concave surface |
| 82.3 | ..Wherein the perforated member is other than flat | 89.4 |Stationary flat circular surface |
| 82.4 | ..With series of axially aligned rotary knife blades | 91 | ..Rotating comminuting surface having openings |
| 82.5 | ..With rotary knife before member | 92 | ...Radial comminuting face |
| 82.6 | ...Tube having configured interior surface | 93 | ...Outer peripheral comminuting face |
| 82.7 | ..With rotary knife after member | 94 | ..Reciprocal comminuting surface having openings |
| 83 | ..Comminuting surface provided with openings to permit discharge of material | 95 | ..Stationary comminuting surface having openings |
| 84 | ..Cooperates with moving comminuting surface or member | 96 | ..Oversize rejection by comminuting surface |
| 84.1 | ...Loose cylinder or sphere | 97 | ..With recirculation of material to comminuting zone |
| 84.2 | ...Travelling roll surface or member | 98 | ..With agitator |
| 84.3 | ...Oscillating surface or member | 99 | ..Bottle breakers |
| 84.4 | ...Rectilinearly reciprocating surface or member cooperates with rotary comminuting member | 100 | ..With independent removable or detachable material receiver or receiver engaging means |
| 85 | ...Rotary comminuting surface having openings cooperates with moving surface | 101.01 | ..Combined or convertible |
| 86 | ...Cooperates with rotary comminuting member | 101.1 | ..Convertible to non-comminuting apparatus |
| 86.1 |Material thrown against perforated surface by centrifugal force | 101.2 | ..Combined with non-comminuting means |
| 86.2 |Comminutor mounted for movement relative to rotating support member | 101.3 | ...With means to indicate condition of apparatus, work or product |
| 87 |Screen or screen elements move during comminution | 101.4 | ...Prior shaping means (e.g., quartering) |
| 87.1 |Offset fingers on stationary surface and on rotary member | 101.5 | ...With material handling other than to or from comminuting zone |
| | | 101.6 |And means to mix plural materials |

101.71	...With support vehicle	118	...With planetary movement of plural surfaces
101.72	....Having extendable, comminutor-supporting arm	119	...With material moving or discharge means
101.73	.....Reciprocating surface-type comminutor	120	...Positively driven plural surfaces
101.74	....Self-propelled vehicle	121	...Plural surfaces forcible away from common surface
101.741	.....Refuse support vehicle	122	...Common surface rotates on horizontal axis
101.742	.....Self-loading from ground	123	..Planetary movement of plural surfaces
101.75	....Detachable from propelling vehicle	124	...With material moving or discharge means
101.76	.....From rear	125	...Compounded planetary movement
101.761	.....Tub grinder	126	...Positively driven plural surfaces
101.762	.....Operated while propelled	127	...Forcible away from common surface
101.763	.....Self-loading from ground	128	....Pivotally mounted for forced movement
101.77	.....From front	129	....Centrifugally urged toward contact
101.78	....Manually propelled	130	.....With centrifugal force modifying means
101.8	...With mixer	131	...Centrifugally urged toward contact
102	..Comminuting surface deformable by contact with material	132	...With means in addition to weight of plural surfaces for urging surfaces toward contact
103	..Rolls frictionally driven and supported by relatively moving surfaces (e.g., ball chasers)	133	...Rotors independently forcible away from common surface
104	..With additional diverse type of comminutor	134	..Parallel material flow through plural comminuting zones
105	..Plural comminuting zones	135	..With unitary or interconnected feed mechanisms or controls for plural zones
106	..Frictional drive surface on horizontal axis	136	...Interconnected means forcing material against moving comminuting surface or surfaces
107	..Plural rotary or oscillatory surfaces cooperate with common surface (e.g., chasing mills)	137	..All comminuting zones of loose grinding body type
108	..With additional diverse type of comminutor	138	..All comminuting zones of rotary striking member type
109	..With material feeding mechanism or control	139	..All comminuting zones of cooperating surface type
110	..Plural surfaces move across common surface	140	...All comminuting zones of compound movement type
111	..Outer peripheral contact of common surface by plural surfaces	141	...All comminuting zones of rotary surface type
112	...With surface cleaner or scraper	142	....Circumferential or tangential material flow only
113	..Plural surface cooperate with each other	143	....All cooperating surfaces rotate
114	..Radial faces of plural rotary surfaces cooperate with common surface		
115	..Plural sets of plural surfaces cooperating with plural common surfaces		
116	...Coaxial rotors radially arranged on same side or common surface axis		
117	..Common surface moves during comminution		

144	.....Rotary surfaces of separate zones coaxial	171	..With feed and/or discharge
145	.....Simultaneous adjusting or positioning of separate surfaces	172	..With independent means moving or guiding the material and/or grinding bodies in receptacle
146	....Axial or radial material flow only	173	...Rotary grinding body pusher (e.g., ball chasers)
147	...All comminuting zones of reciprocating surface type	174	....Horizontal axis
148	....Oscillating surface	175	..Compound movement receptacle
149	....Vertical rectilinear movement	176	..Rotating receptacle
150	.....Annularly mounted moving surfaces	177	...Tiltable axis of rotation
151	..All comminuting zones of single surface zones	178	...Roller supported receptacle
152.1	.Series material flow only through plural comminuting zones	179	..Receptacle structure
152.2	..Diverse type comminuting zones	180	...With non-axial opening
153	..All comminuting zones of loose grinding body type	181	...With lifting or distributing at extremity of receptacle
154	..All comminuting zones of rotary striking member type	182	...With lining
155	..All comminuting zones of cooperating surface type	183	....With lifting or distributing characteristics
156	...All comminuting zones of compound movement type	184	..Grinding bodies
157	...All comminuting zones of rotary surface type	185.5	..Rotary striking member with feed or discharge conveyor or regulator
158	....Circumferential or tangential material flow only	185.6	..Rotary striking member combined with pump
159	.....All cooperating surfaces rotate	186.1	..With distinct plural paths to striking member
160	.....One surface of each couple nonrotary	186.2	..Feed or discharge regulator
161	....Axial or radial material flow only	186.3	...Including means to alter direction of flow
162	.....Common axis of rotation	186.35	..Endless loop feed or discharge conveyor
163	.....Horizontal axis	186.4	..Rotating or oscillating feed or discharge conveyor
164	...All comminuting zones of reciprocating surface type	186.5	...Screw feed or discharge conveyor
165	....Vertical rectilinear movement	187	..Rotary striking member with moving cooperating surface or member
165.5	..All comminuting zones of rotating noncooperating type	188.1	..Rotary striking member with axial or radial flow of material
166	..With comminuting member cleaner or scraper	188.2	..Radial flow, pin-disc comminutor, overlapping pins on cooperating members
167	..Contacting working surfaces of rotary comminuting member	189.1	..Rotary striking member with circumferential or tangential flow
168	..Hand support comminutor	189.2	..Reversible rotary mill
169	..Reciprocating cooperating comminuting surfaces	190	...With intermeshing impact members
169.1	..Rotary tool	191	..Rotary striking member, rotor structure
169.2	..Masher or pestle	192	..With striking member adjusting means
170	..Loose grinding body comminutor (e.g., ball or rod mills)		

193	..With loosely mounted striking member	213	.....Bottom shaft adjusting means
194	..Striking member pivoted to rotor	214	....Eccentric shaft gyratory drive
195	..Rotary striking member or hammer	215	....Eccentric gyratory sleeve below gyratory member
196	..Loose ring type	216	....With gyratory member sealing means
197	..With attached wear member	217	...Unitary comminuting member and eccentric strap
198.1	..Cooperating comminuting surfaces (e.g., jaw crusher)	218	....With moving cooperating surface
199	..Batch type (e.g., mortar and pestle)	219	...Comminuting member pivoted to oscillating supporting link
199.1	...With means to move batch container or support	220	..Rotary surface (or surfaces)
199.2	....Intermittent movement of support interrelated with movement of cutter or knife	221	..Circumferential or tangential flow of material (e.g., roll mills or roll and concave mills)
199.3	.....Rectilinearly reciprocating knife	222	....With material feed and/or discharge mechanism or control
199.4	.....Rocking knife	223	.....Endless belt conveyer
199.5	....Uni-directional movement of support	224	.....Hopper
199.6	.....With means to feed or discharge batch	225	.....With roll or rotary material agitator
199.7	.....With revolving tool	226	....With material retaining means at axial end of rotary surface
199.8	.....With rectilinear reciprocating tool	227	....Both cooperating surfaces rotate (e.g., roll mills)
199.9	...Stationary container or support	228	.....Internal comminuting surface
199.11	....With rectilinear reciprocating tool	229	.....Surfaces rotate in same direction and/or mounted on non-horizontal axis
199.12	....With rotary tool	230	.....Adjustably or yieldably mounted rotary surface
200	..Endless belt type comminuting surface or surfaces	231	.....Hydraulic or pneumatic mounting and/or axially yieldable or adjustable
201	..Compound movement comminuting surface or surfaces	232	.....Pivoted roll support
202	...With feeding and/or discharging mechanism or control	233	.....Adjustable pivot
203	...Rotary component	234	.....Both rotating surfaces adjustable or yieldable
204	....Circumferential or tangential flow of material	235	....Cooperating non-smooth surface characteristic
205	....Rotating and reciprocating surface	236	.....Intermeshing
206	....With moving cooperating surface	237	....With non-rotary surface moving means
207	....Gyratory or planetary movement	238	....With plural alternatively usable nonrotary surfaces and/or retractable rotor projections and/or adjustably or yieldably mounted rotary surface
208	.....Eccentric drive sleeve within gyratory member		
209	.....With upper guide or support for gyratory member		
210	.....Unbalanced weight drive		
211	.....Gyratory member yieldinly mounted		
212	.....Upper gyratory drive		

239	....Nonrotary surface adjustable or yieldable relative to rotary surface	265	....With feed and/or discharge mechanism or control
240	.....Sectional nonrotary surface having independently adjustable or yieldable parts	266	....With moving cooperating surface
241	.....Radially of rotary surface	267	....Link and eccentric type actuator
241.5	.....Single roll jaw crusher	268	....Serial pivoted links type actuator or link with lever type actuator (e.g., toggle type)
242	....Cooperating non-smooth surface characteristics	269	.....Means actuating pivot of serial links
243	.....Intermeshing	270	..Vertical rectilinear movement (e.g., stamp mills)
244	...Axial or radial flow of material (e.g., disc mill, or cone and shell mill)	271	....With feeding and/or discharging mechanism or control
245	....With feed and/or discharge mechanism or control	272	....With means to rotate moving surface on non-comminuting stroke
246	.....Axially mounted rotary propeller or screw	273	....Gravity projected surface only
247	.....Horizontal axis	273.1	.Multi-barbed comminuting face (e.g., grater)
248	.....Hopper supply	273.2	..On radial face
249	.....Subjacent shaking shoe or receptacle	273.3	..Cylindrical
250	....With moving cooperating surface	273.4	..Stationary curved face
251	.....Both cooperating surfaces rotate	274	.Stationary comminuting surface or material bed
252	.....Non-coaxial or eccentric	275	..Centrifugal projection of material
253	.....Vertical axis	276	..Conveyer material forcing means (e.g., scroll type or locomotive stoker type)
254	....With rotary surface axis noncoaxial or eccentric relative to nonrotary surface axis	277	.Rotating comminuting surface
257.1	....Vertical axis	278.1	..Radial comminuting surface
258	.....Rotary shaft supported above rotary comminuting member	278.2	..Internal comminuting surface
259	.....Adjustable rotary member	279	..with means to support material for rotation during comminution
259.1	....With means vary space between surfaces	280	..With means to force material toward periphery of comminuting surface
259.2	.....By fluid	281	...Means engaging sides of column of material
259.3	.....Surface yieldably held in position	282	...Radially arranged rectilinearly reciprocating follower
260	....Cooperating non-smooth surface characteristics	282.1	..Elongated edged member
260.1	.....Worm or screw comminutor	282.2	...Detachably secured to a rotary element
261	.....Intermeshing	283	.Reciprocating comminuting surface
261.1	.....Conoidal surface	284	.Mutual attrition or compression comminutors
261.2	.....Opposed, flat coaxial surfaces (e.g., disk mill)		
261.3	.....Having plural angularly related land and groove		
262	..Reciprocating surface or surfaces		
263	...Parallel motion		
264	...Oscillating comminuting surface		

285.1	.Comminuting mounting means, frames or other normally stationary structure	FOR	CLASS-RELATED FOREIGN DOCUMENTS
285.2	..Removable or displaceable housing section		
285.3	...Pivoted housing section		
286	..With means to adjustably or yieldably mount normally stationary comminuting element	DIG 10	FOUNDRY SAND TREATMENT
287	...Pivotally mounted	DIG 14	GRINDING IN INERT, CONTROLLED ATMOSPHERE
288	....Self-adjusting (e.g., universal mounting)	DIG 17	ICE CRUSHERS
289	....Yielding	DIG 27	PILL OR TABLET CRUSHERS
290	...Yieldingly mounted	DIG 30	RUBBER ELEMENTS IN MILLS
291	.Comminuting elements	DIG 31	RUBBER PREPARATION
292	..with balancing means	DIG 37	CRYOGENIC COOLING
292.1	..Edged blades extending radially	DIG 38	SOLID WASTE DISPOSAL
293	..Cylindrical or frusto-conical (i.e., peripheral comminuting face)		
294	...Sectional or separable surface element		
295	....Annular sections		
296	..Disklike comminuting surface (i.e., radial comminuting face)		
297	...Plural comminuting faces		
298	...Prefabricated assembled surface sections or parts		
299	..Annular internal comminuting face		
300	..Wear face to backing connections		
300.1	..Plural stationary edged blades		
301	.Miscellaneous		

DIGESTS**CROSS-REFERENCE ART COLLECTIONS**

600	FURNACE STOKERS
601	SAND MULLERS
602	SOAP DISPENSERS
603	ANIMAL POWERED MILL
604	PLURAL INLETS FOR DIVERSE SOLID MATERIALS
605	HAY UNBALER
606	MEDICAL/SURGICAL WASTE COMMINUTION

FOREIGN ART COLLECTIONS